



Backpack Product Design

Performance Task

Introduction

You are a backpack designer working for a backpack company. Your goal is to design a new unique backpack that will stand out in a crowd. The backpack company you work for will be anxious to see your new design so they can start the manufacturing. You will start by drawing a sketch of your design then you will create a prototype that you can present to the company.

Big Idea / Essential Questions

Big Idea

- Math and engineering play a significant role in product design.
- A technological world requires an understanding of how things are made and can be improved.
- The engineering design process can help to solve a problem.

Essential Questions

- How do human wants and needs affect the products that are used and created?
- How does technological design help create inventions and innovations?
- How does the cost of a product affect people's decisions on whether or not to buy it?

G.R.A.S.P.

Goal

Your goal is to create a unique backpack that your company will want to manufacture. You will take your backpack from the sketch phase to the prototype phase, finally presenting it to the marketing team.

Role

You are a backpack designer working for a company that produces backpacks. You are responsible for designing a new backpack that stands out in the crowd.

Audience

Your audience is the marketing team of the company.

Situation

You are a creative designer working for a company that produces backpacks. You are responsible for designing a new backpack that stands out in the crowd. You will take your pack from the sketch phase to the prototype phase, finally presenting it to the marketing team. Make sure you decide what your target audience will be. For example, will your backpack be designed for middle school-age children or high school age children? Whether it is for adults, children, students, campers or athletes, you will need to think carefully about a few things for your target audience:

What special features will your backpack have that your target audience will find useful?

What will your backpack be made of so it will work for the user in a particular environment?

What do you want your backpack to look like so the audience will find it attractive?

Products

1. Backpack Design

Design a backpack. Try to come up with a unique design elements for your backpack. You want your pack to stand out and have better features than all the rest. Remember, your backpack must be functional as well as "cool looking".

Begin your design phase with a detailed sketch of your backpack which includes labeled measurements to the nearest 1/2 or 1/4 inch and color patterns.

Next, you will create a pattern for your pack; include labeled measurements and area of the pattern you will use.

If possible, create a prototype of your pack.

Materials for the prototype do not need to be the materials you would use on your final product.

- What are colors, sizes, and shapes of popular backpacks right now?
- What are some helpful features that a backpack should have?
- How much material do you need for your backpack? How will math help you decide?

Backpack Design - Backpack Product Design

Achievement Levels	1	2	3	4
Drawing/Prototype (x1)	Prototype or drawing is not detailed. Few features of the backpack are labeled.	Prototype or drawing has partial detail. Some features of the backpack are labeled.	Prototype or drawing is adequately detailed. Most features of the backpack are labeled.	Prototype or drawing is very detailed. All features of the backpack are labeled.
Research (x1)	Product shows that little research was done on this topic.	Product shows that some research was done on this topic.	Product shows that adequate research was done on this topic.	Product shows that thorough research was done on this topic.
Area (x1)	Design and math work show little understanding of area.	Design and math work show partial understanding of area.	Design and math work show understanding of area.	Design and math work show strong understanding of area.

Achievement Design Levels	1	2	3	4
(x1)	Product shows that student(s) thought very little about what size, materials and features are best for the audience.	Product shows that student(s) somewhat thought about what size, materials and features are best for the audience.	Product shows that student(s) thought about what size, materials and features are best for the audience.	Product shows that student(s) put a lot of thought into what size, materials and features are best for the audience.
Measurement	Student(s) attempts to use a ruler to measure lengths and widths of parts of the backpack.	Student(s) uses a ruler to somewhat successfully measure lengths and widths of parts of the backpack.	Student(s) uses a ruler to adequately measure lengths and widths of parts of the backpack.	Student(s) uses a ruler to expertly measure lengths and widths of parts of the backpack.
(x1)				

2. Cost Analysis

Using the measurements from your design pattern, estimate how much it would cost to create one backpack. Keep in mind, you will need to decide on what materials you will use to create your pack.

Determine how much of the materials you will need per pack (by finding the area of each section of your design).

Find a price for the type of material you will use to help find the total cost of one backpack. Create a chart illustrating these costs.

- What are colors, sizes and shapes of popular backpacks right now?
- How can you estimate what the cost will be?
- How much do you think it will be to make one backpack?
- What materials will you need to create this backpack?

Cost Analysis - Backpack Product Design

Achievement Levels	1	2	3	4
Organization of Chart (x1)	Costs are unorganized, making it difficult to read and understand them.	Costs are partially organized, making it a little difficult to read and understand them.	Costs are organized. The audience can read and understand them.	Costs are neatly organized in a way that is very easy to read and understand.
Area (x1)	Math work shows little understanding of area.	Math work shows some understanding of area.	Math work shows understanding of area.	Math work shows strong understanding of area.
Mathematical Thinking and Operations (x1)	Product shows little understanding and use of addition, subtraction, and multiplication strategies.	Product shows some understanding and use of addition, subtraction, and multiplication strategies.	Product shows understanding and use of addition, subtraction, and multiplication strategies.	Product shows excellent understanding and use of addition, subtraction, and multiplication strategies.
Cost Analysis (x1)	Product shows that student(s) thought very little about how the costs to make the backpack might affect the selling price.	Product shows that student(s) partially thought about how the costs to make the backpack might affect the selling price.	Product shows that student(s) thought about how the costs to make the backpack might affect the selling price.	Product shows that student(s) thoroughly thought about how costs to make the backpack might affect the selling price.
Research (x1)	Product shows that little research was done around the topic.	Product shows that some research was done around the topic.	Product shows that research was done around the topic.	Product shows that thorough research was done around the topic.

3. Photostory

The backpack company wants you to think carefully about how people all over the world have carried their things throughout history. You will need to create a Photostory

that uses pictures of packs or backpacks that have been used by people over the centuries.

Be sure to look at different designs from different parts of the world. Each picture should explain how the pack was used and what types of things were typically carried in the pack. This photostory will be a helpful and historical study of backpacks.

- Why were backpacks created and how are they helpful to humans?
- How have people all over the world carried their things throughout the centuries?
- How has a backpack been used in a specific culture?
- What materials were used to make this backpack?

Photostory - Backpack Product Design

Achievement Levels	1	2	3	4
Design Information (x1)	Product has little explanation of each backpack's features and how people used it.	Product has some explanation of each backpack's features and how people used it.	Product has an explanation of each backpack's features and how people used it.	Product has thorough explanation of each backpack's features and how people used it.
Organization (x1)	Photos and facts/details are unorganized, making it difficult to read and understand.	Photos and facts/details are partially organized, making it a little difficult to read and understand.	Photos and facts/details are organized. The audience can read and understand them.	Photos and facts/details are neatly organized in a way that is very easy to read and understand.
Backpacks - History/Geography (x1)	Product has examples of backpacks but not from different places or time periods.	Product has examples of backpacks from a couple different places or periods in time.	Product has examples of backpacks from different places or periods in time.	Product has examples of backpacks from many different places or periods in time.
Research (x1)	Product shows that little research was done around the topic.	Product shows that some research was done around the topic.	Product shows that research was done around the topic.	Product shows that thorough research was done around the topic.

4. Presentation

Remember, not all designs are chosen for production. So, in order for your design to be chosen, you must convince the marketing team your product is the best.

Create a multimedia presentation that will highlight your product. Include the type of material and the measurements, as well as the area of each of the sections, so your audience can see how you decided on your cost. Include the total volume of your backpack as well.

Be sure to include sketches and any other visuals that could enhance the presentation. Explain the features that make your pack better than others. Be prepared to explain why you made the design choices you did.

- What will your backpack look like?
- How will it stand out?
- Why is your design unique and why should they choose it?
- How much will your backpack cost considering all the materials?

Presentation - Backpack Product Design

Achievement Levels	1	2	3	4
Delivery (x1)	Presenter makes little attempt to have good eye contact and a loud, clear voice during the presentation.	Presenter makes very good eye contact and has a loud, clear voice during some of the presentation.	Presenter makes very good eye contact and has a loud, clear voice during the most of the presentation.	Presenter makes very good eye contact and has a loud, clear voice during the whole presentation.
Persuasive Speaking (x1)	Audience is not persuaded because there is little explanation of the benefits of the backpack.	Audience may or may not be persuaded through a partial explanation of the benefits of the backpack.	Audience is somewhat persuaded through an adequate explanation of the benefits of the backpack.	Audience is persuaded through a very detailed explanation of the benefits of the backpack.
Support Materials (x1)	Very few materials used in the product strongly support the information being presented.	Some materials used in the product strongly support the information being presented.	Most materials used in the product strongly support the information being presented.	All materials used in the product strongly support the information being presented.
Engineering and Design (x1)	Presentation shows that student(s) somewhat thought about what size, materials and features are best for the audience.	Presentation shows that student(s) somewhat thought about what size, materials and features are best for the audience.	Presentation shows that student(s) thought about what size, materials and features are best for the audience.	Presentation shows that student(s) put a lot of thought into what size, materials and features are best for the audience.